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REPORT OF THE INVESTIGATING COMMITTEE
CPP WASTE TANK WM-187 LEAKAGE
OF
MARCH 17, 1962

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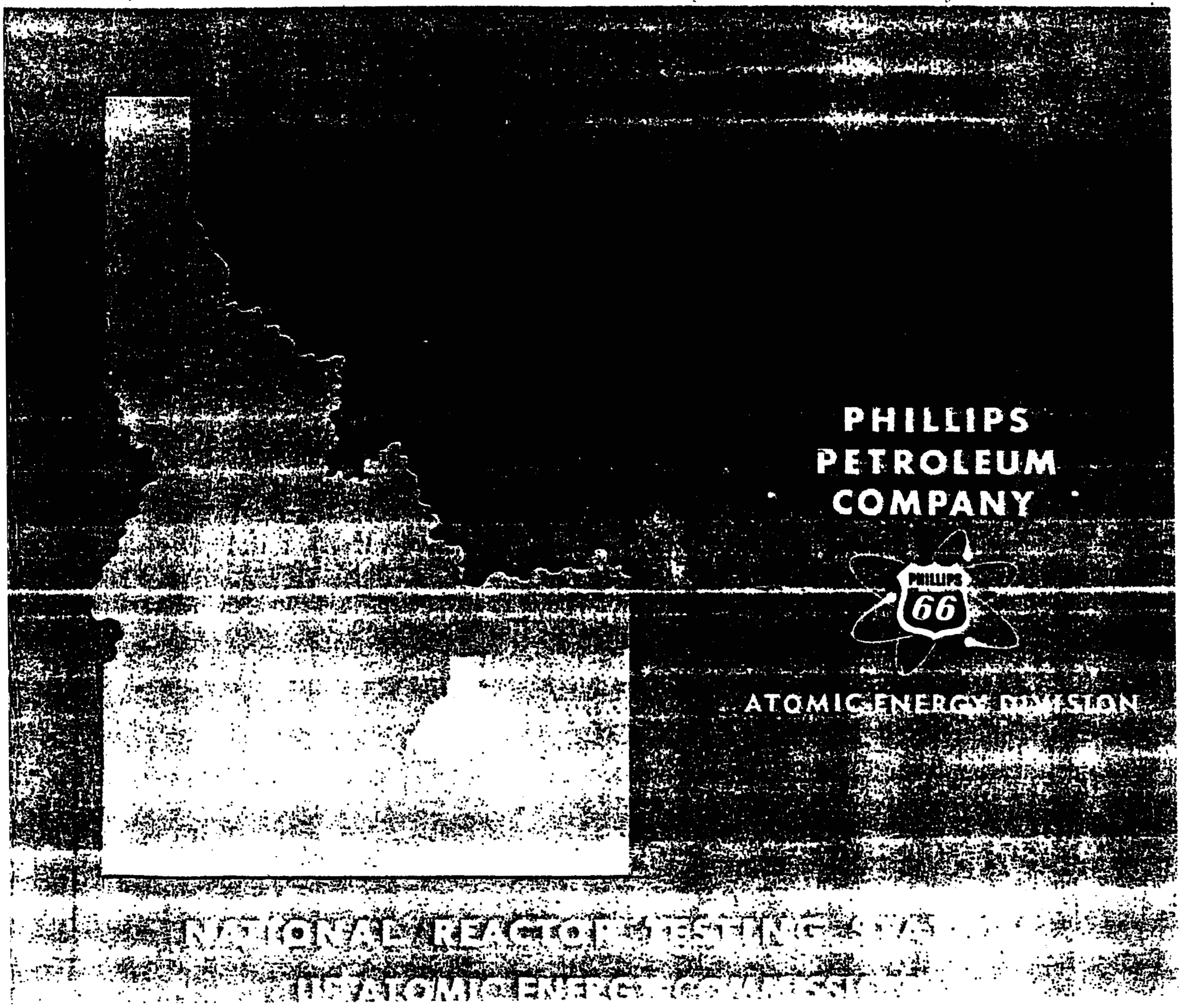
J. W. Latchum, et al

April 17, 1962



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REPORT OF THE INVESTIGATING COMMITTEE

CPP WASTE WANK

WM-187 LEAKAGE

of

March 17, 1962

by

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ABSTRACT

A leakage of 31,700 gallons of radioactive first cycle aluminum nitrate-nitric acid raffinate waste from CPP Waste Tank WM-187 to the monolithic concrete secondary retention vault occurred between 1530 hours on March 16 and 1300 hours on March 17, 1962. On March 19-20, 1962, a similar situation occurred with regard to CPP Waste Tank WM-185 and 33,500 gallons were released to the vault. Although the mechanism of the transfer of liquid radioactive waste was determined early to be the result of a siphon established through the vault sump jet piping to the tank and the integrity of the tank(s) was reassured, the WM-187 incident did draw attention to the need for improvements in instrumentation, operating procedures and storage facility design. Furthermore, since one of the contributing causes of the incident was the previous accumulation of condensate or external water within the tank vault, the nature and seriousness of this particular aspect was also considered worthy of study. An attempt to evaluate the nitric acid damage to vaults is included. These studies, together with recommendations for correcting the problems noted above, are presented in this report with the object of (1) reassuring high confidence in radioactive waste containment and (2) outlining a basis for better design criteria for future waste tank construction.

CPP WASTE TANK

WM-187 LEAKAGE

of

MARCH 17, 1962

A. SUMMARY

Investigation revealed the reported leakage of radioactive waste from WM-187 was in actuality an inadvertent transfer of approximately 31,700 gallons of first cycle aluminum nitrate-nitric acid raffinate stored in the underground tank WM-187 of the CPP to the monolithic concrete secondary retention vault between 1530 hours on March 16 and 1300 hours on March 17, 1962. On March 19-20 a similar situation occurred with regard to WM-185 and essential facts are included in this report. These transfers were caused by the vault sump jet lines acting as a siphon following jetting, to drain the tank to the vault. Lack of design knowledge of operating personnel and the nature of the sump jet design were the causes for the incidents.

It is believed very little if any waste was lost to the ground. Monitoring holes drilled in the area subsequent to the incident showed no significant evidence of contamination. Property damage resulting from the incident is limited to (1) the direct attack on the concrete, and (2) residual contamination which will be retained in the concrete vault for an indefinite period. Recommendations to minimize recurrence of this incident in existing tankage include development of a sump jet operating procedure, installation of a purge system on the jets, revision in the location of sump alarm points and review of waste in-tank instrumentation and methods of maintenance. Future waste tank storage construction should incorporate the several design recommendations included in the report. There were no significant personnel exposures nor was plant evacuation required. The current knowledge of the underground formations, water movement and the small possibility of the loss of waste make the probability of any claims against the government appear remote. Cost of the incident is estimated at $10,000 based on permanent storage (~$2.50/gal) of 3,900 additional gallons of condensed steam added to the solution as a result of jetting.

B. FINDINGS

1. Tank Farm Description

The CPP Waste Tank Farm is located in the NE quarter of the plant yard directly east of Building CPP 630 (Exhibit 1). The nine 300,000 gallon stainless steel tanks were constructed to hold first, second and third cycle aqueous raffinate waste and were constructed in four stages (Exhibit 4).

Tanks WM-180 through WM-186 are housed in individual octagonal undergound concrete vaults. The vaults for WM-180 and WM-181 are of monolithic construction except for the roofs which are of beam and poured slab construction, having a truncated pyramid shape. The vaults for WM-182 through WM-186 are constructed of precast concrete columns, beams and slabs and the walls for all vaults (WM-180 through WM-188) rest upon heavily reinforced monolithic concrete foundation pads poured over a basalt base. The roofs for WM-182 through WM-186 are of flat beam and slab construction. The vaults for WM-187 and WM-188 are contiguous monolithic concrete boxes with flat beam and slab roofs similar to that employed on the vaults for WM-182 through WM-186. Each vault was provided with two small sumps of 7 gallons capacity each into which waste liquid from the tank collection trench boxes or water from external sources (melting snow, rain, ground water, or condensation) can be collected. Liquid from any source drains from the floor slab into the sumps. Originally it was not anticipated that any external water would find its way into a vault; consequently the primary purpose of the small sumps was to provide a quick means for detecting tank leakage and the alarm setpoint is at 12 inches above bottom of the sumps. Since it only requires about 7 gallons to fill each sump to alarm point, condensation or external water entering the vaults essentially nullified the original purpose of the sumps. Liquid from the sumps can be jetted back into the storage tank (except WM-180 and WM-181 where sumps jet back to the alternate tank) by connecting a steam hose to a connection provided for that purpose above ground level. Liquid jetted from the sumps into the tank is discharged through a dip leg extending down to a point 8 inches above the tank bottom (Exhibit 2) except the WM-180 and WM-181 sumps where the liquid discharges into the tops of the tanks. One-quarter inch vent holes on the sump jet line just inside the tank on tanks WM-182, -183, and -184 were requested after a field check review of the facilities by Phillips Petroleum Company (letter Rig-149-55A) to permit venting of the line and prevent possible back siphoning from the tank to the vault. The vent holes are not shown in the as-built drawings. A Change Order dated September 14, 1955, with sketch number 796-231 specifies drilling two one-quarter inch vent holes one-half inch below the point of entry of the dip leg into the tank.

The purpose of the dip leg on the jet discharge inside the tanks is to provide a liquid seal. The liquid seal was installed to prevent air from being drawn in through the jets from the tank vault into the tank and thence into the off-gas condenser and associated system (Exhibit 2), inasmuch as the storage tanks are normally kept under a vacuum of from 1 to 1½ inch of water (except WM-181 which is not connected to the vessel off-gas system). The tanks are designed for plus 10 inches to minus 2½ inches water pressure in the vapor space. This same liquid seal also prevents reverse flow of gas from the tank back into the tank vault and directly to atmosphere through the vault vent lines at times when pressure in the storage tank is slightly higher than atmosphere. Discharge of the jet effluent below liquid level also serves to condense carry over steam from the jet which might otherwise overheat the vapor space in the tank, and to prevent splashing of waste from a free fall.

There are many construction joints in the vaults for tanks WM-182 through WM-186 and the type of construction employed does not readily lend itself to waterproofing which would prevent the entry of surface runoff water or subsurface water. The monolithic vaults for tanks WM-180, WM-181, WM-187 and WM-188 should be essentially watertight except for the roof portions.

All tank roofs are approximately nine feet below grade. All interconnecting piping is buried and control and diversion valves are operated with extension handles. Three buildings, CPP Building 628, 634 and 635 house the instrumentation, cooling water storage and pumping and service facilities.

Each tank is cooled by closed water system (except WM-181, WM-184 and WM-186).

2. Description of Tank WM-187

Tank WM-187 (Exhibit 2), a 50' dia. x 21' high (straight side) tank has a capacity of 350,000 gallons with a working volume of 300,000. The tank is equipped with a twelve-point temperature indicator and recorder, liquid level recorder, specific gravity recorder, pressure-vacuum recorder, and a liquid level indicator with an alarm for each of the two sumps. Pneumatic probes are used. The tank is ventilated through the vessel off gas system with an emergency vacuum-pressure relief system vented directly to the CPP stack. The tank has a vapor condenser for condensing vapors from WM-187 and WM-188 (common unit), housed in a concrete pit near the northwest corner of the WM-187 vault.

3. Procedural Control of 300,000 Gallon Waste Tanks

The following existing Standard Operating Procedures relate to the waste storage tanks.

SOP 25.02	First Cycle Waste Transfer, Air Lift Operation
SOP 25.10	Operating Instructions for WM-180 Permanent Storage Vessel
SOP 25.11	Operating Instructions for WM-181, WM-184 and WM-186 Tanks
SOP 25.12	Operating Instructions for WM-182, WM-183, WM-185, WM-187 and WM-188 Tanks
SOP 25.13	Procedure for Intertank Transfers 180 Series

In addition to the above there are several letters and oral instructions which are in effect regarding lock out procedures, jetting of sumps, etc.

4. Operational Background

The tank farm design concept was based upon the requirement of secondary waste storage confinement and the belief that the secondary barrier, the vault, would remain in a static (dry) condition as long as the integrity of the tank was maintained. A tank failure was considered highly improbable; however, due to the serious consequences a mass release of radioactive wastes might have on the environs, the double containment concept was considered necessary. Commensurate with the probability of tank failure, only minimum transfer equipment and instrumentation were provided.

Operating experience has proven that the vault sumps do not always remain dry but are sometimes, usually during the spring thaw, filled from an external source. Ground water has, in the past, been observed in the vaults as a result of leaking plant water lines. Whether the source is ground or surface water seepage is not really known; however, this experience has necessitated occasional jetting of the vault contents to the tanks. The sump jetting frequency has not been great, perhaps seven or eight times over the past three years with no jettings being recollected during 1960 and the first ten months of 1961. During the two months prior to the incident, however, heavy precipitation and warm weather caused considerable flooding in the NRTS area and the incidence of vault seepage was incurred again. One of the consequences of this seepage has been to nullify the original intent of a high sump level alarm by the more or less "routine" explanation of water flooding.

The excess water in the vault sumps also resulted in certain off-standard instrument conditions. The high level sump alarms, for instance, were set for immediate detection of a tank leak. During the periods of ground water seepage the liquid level in the sumps was often above this setpoint which meant the panel board lights were in a continual state of high level alarm. Furthermore, the range of the sump indicator instruments was small (15 inches of water). Although this was adequate under the original assumptions of the design criteria, the instruments were underranged for the actual conditions and many of the sump indicators read full-scale during part of the periods of water seepage. In many cases, it was necessary to substitute a manometer for the sump indicator instrument to determine actual liquid levels for jetting sumps. At the time of the incident, the liquid level probe in south sump of WM-18[illegible] was connected to a [illegible]-inch water manometer.

Sampling and jetting operations are usually performed on the day shift. The shift tours are usually made during the first hour of the shift to determine tank liquid levels, temperature, pressures, and the specific gravity of the tank contents. The vault sumps are provided with a non-recording liquid level indicat The operators are responsible for determining significant changes and reporting them to the supervisor. The supervisor in turn is responsible for determining tl validity of these reports and for taking such action as he judges necessary.

5. The Incident

On Saturday, March 17, 1962, the 2400-0800 shift operator noted "a larg buildup in the WM-187 sump" (20.2 inches to 45.3 inches) and "a decrease of liqui level in the WM-187 tank" (34.5% of chart to 30%) at 0030 hours. He recorded the readings in the tank farm log, marked the two readings with an asterisk, and repc the increase in the sump reading to his supervisor. The supervisor made a persor check of the sump instrumentation and requested the shift instrument man to verif the sump reading. Since the north sump indicator was overranged (15+ inches) the south sump, which was hooked up to a manometer behind the panel board, was the or sump instrument in operation. After the instrument man had verified the accuracy of the instrument the supervisor apparently decided 1) that the instrument readir variance from the previous shift might have been due to confusion regarding which instrument was to be read, that is, the dial indicator on the board or the manome and 2) the high sump reading was most likely due to ground or surface water seepa into the vault. Accordingly, the supervisor noted in the shift supervisor's log the day shift should "check out in the day light". He judged that the sump incre was due to ground water and that the appropriate action to be taken would be to s the sump water (a day shift job requiring heavy equipment for the removal of shie blocks) and then jet the water into the tank. The significance of the tank liqui level change was apparently not noted or at least not considered.

When the following shift check was made at approximately 0930 hours, th day operator noted "the manometer connected to the WM-187 sump had gone off-scale and the "liquid level of the WM-187 waste tank was far below the previous shift reading". He immediately informed his supervisor who reported to the area and es lished the following:

a. The instrument reading was valid (he had the instrument checked ag

b. The liquid level of the sump was 65.5 inches of water pressure.

c. WM-187 liquid level had been dropping for the previous 16 hours at a rate of approximately 1500 gallons per hour.

d. Neither the north nor south sump alarms were activated on the pane board and the alarming equipment was inoperative.

e. Approximately 28,000 gallons had transferred from the tank to the s

f. Both sumps had been jetted the previous afternoon.

The supervisor then notified the superintendent, at his home, that he "believed WM-187 was leaking" and initiated action for jetting the sumps.

Jetting of the sump into WM-187 and transferring of WM-187 to WM-186 was started at 1300 hours and continued until the sump had been emptied and the WM-187 liquid level had been lowered to a point where transfer into the sump was stopped. A sample of the sump was obtained which verified the assumption that the liquid in the sump had come from the tank.

The following Monday, March 19, on the 1600 to 2400 shift, the WM-185 tank began transferring to the vault in a similar manner after sump jetting. During the efforts to arrest the WM-185 transfer (Exhibits 5 and 6) it was determined that the transfer mechanism was most probably due to siphoning via the sump jet discharge line which extended to within 8 inches of the bottom of the tank. Since the conditions for the WM-185 occurrence were very similar to the WM-187 incident, this transfer mechanism was considered most probable in the latter case. This was proven on Wednesday, March 22, when solution was jetted into WM-187 from WM-188 to a level equal to the level of the tank contents at the time of the incident and no "leak" was experienced.

6. Post Incident

The physical damage incurred as a direct result of the incident is considered insignificant. Since the tank and associated materials of construction are stainless steel, no damage, immediate or long term, is anticipated. Some etching of the vault concrete is to be expected; however, it is doubtful that significant damage will be incurred. Corrosion tests made on a concrete sample (Exhibit 7) indicate that the chemical attack of the aluminum type acid waste on concrete is of smaller magnitude than that of nitric acid alone. The initial reaction was rapid, tapering off as the nitric acid is consumed.

Two factors were considered which could have longer lasting detrimental effects. The tank rests on a large pad of sand. The sand was totally submerged and can be expected to retain some liquid after the vault has been emptied. It has been estimated that as much as 600 gallons of waste could have been retained in the sand. Whether this liquid would be slowly leached to the sump area by future high sump waters effectively sustaining an etching reaction on the cement of the concrete joints, or would be leached to the environs, is a matter difficult to determine. In either case, the damage was considered negligible.

Total cost related to the incident is estimated at $10,000. The direct costs of both the WM-185 and WM-187 occurrences are associated primarily with the waste tankage consumed by the jet dilution water generated during the sump transfers (Exhibit 8). Whether or not tank storage losses of this nature are applicable would depend on future realization of such programs as waste evaporation or calcination. Either one would recover, at least in part, waste storage costs of this sort. However, it is felt that a cost penalty of some magnitude is chargeable and, without presently knowing the future program cost advantages, the incident costs must reflect today's experience.

7. Instrumentation

The tank farm instrumentation has been recognized as being inadequate for sometime. In this regard preliminary steps for improving the leak detection system were initiated by the operations group in the form of a request for technical assistance dated September 14, 1961. The request, entitled "Leak Detection System for the Waste Storage Tanks," marked "high priority," and requiring a completion date of "January 1, 1962" outlined the inadequacies of the present leak detection system (water in the sumps and liquid level instrument limitation) and suggested a sump probe or sampling device which would quickly determine radioactivity thus indicating the source of the sump liquid. Work on this request by CPP Technical Branch is still in progress.

It was also recognized by the operating group that a standard visual alar system was necessary for all the plant processes in order to differentiate between an alarm requiring an immediate shutdown of the equipment and an alarm signifying a off-standard condition of lesser importance. In order to accomplish this, amber li were designated for those conditions not requiring immediate process corrective act so that the significance of the red light would be increased and immediate action assured. This system has been incorporated in all of the process panel circuits wi the main process building. Plans have been made to incorporate the new alarm syste in the tank farm but the work has not yet been started.

Inadequacies of the tank farm instrumentation for existing conditions bec apparent in the investigation of the incident. Although the instruments did not ca or significantly contribute to the incident, it is considered appropriate to determ the nature of these inadequacies as they are related to radioactive waste containme

When the sump level increases to 12 inches of liquid a flashing red light occurs on the panel board with the sounding of a horn in buildings 628 and 604. By activating an acknowledge button on the panel board the operator can shut off the horn and the flashing red light is changed to a steady red light. The instrument is then considered to be in an acknowledged-alarm state. To reset the instrument the sump liquid level must be lowered below 12 inches.

At the time of the incident, the WM-187 sump levels were greater than 12 inches which essentially compromised the alarm system since further sump level increase would not cause the alarm to ring. High sump levels and activated (acknowl edged) alarms had become a rather common situation during the high sump periods.

Under these conditions the only practical means for determining waste confinement is by depending upon the tank liquid level instrument. If this instrume became inoperable there would be no secondary defense.

Another aspect of the alarm system is that a burned out alarm light gives the same indication as a nonalarming condition. Thus, if an instrument is in the acknowledged alarm state and the light bulb is burned out there will be no indication that an alarm state existed.

Investigation of the instrumentation following the WM-187 incident reveale 1) that both north and south sump instruments were not in the alarm condition at the time of the incident, 2) an alarm lamp (south) was burned out, 3) the flasher (commo to both north and south) was deficient in such a manner that instead of the initial flashing red light no light occurred, and 4) a disconnect switch located in the building 628 horn circuit was in the off position.

Had the sump level been below the alarm level when the tank began siphoni and normal alarm sequence had been initiated, the flasher would have malfunctioned and the red light would not have flashed on either sump (condition at incident time Pushing the acknowledge button would trip the flasher so that one normal steady red light would have come on. However, since the horn was disconnected by means of a switch in the off position, no audio alarm would have sound in building 628 and the acknowledge button would not have been pushed. With the south sump light bulb burne out, this meant that only the north sump steady red would show if the acknowledge button had been pushed.

The condition of the tank farm instruments at the time of the incident indicates a renewed effort is necessary to assure an adequate preventive maintenance program. An effective PM program would have detected and corrected some of the deficiencies noted. The relamping of the control light, for example, is accomplished by means of a work order issued by Operations as necessary. It would seem a routine matter such as checking for burned out light bulbs should be performed on a periodic basis. Testing of all alarm circuits, for that matter, should be initiated by some periodic procedure. It is only by such means that the operability of any equipment can be assured.

8. Siphoning Theory

Siphoning of first cycle waste from WM-187 tank to the WM-187 vault occurred because 1) a siphon tube was available, 2) conditions were favorable for starting the siphon and 3) once established energy was available to transfer the fluid in the tank to the tank vault.

There are actually two sets of sump piping on WM-187, a typical 300,000 gallon first cycle waste tank, which could act as siphons. The purpose of each set is to transfer waste which may get into the vault back into the tank. A brief description of each system is as follows (Exhibit 2). A steam jet takes suction from a one-foot square by one-foot deep sump and discharges to the inside of the tank. The 2 inch schedule 80 pipe from the jet is routed up the outside of the tank wall thence through the tank roof and down the inside of the tank wall. The pipe terminates eight inches from the tank bottom.

The siphon could have been started or the siphon pipe filled in one of two ways: 1) The siphon pipe was still full after the sumps were jetted on March 15 or 2) steam condensing in the siphon line after the jetting operation with the sump suction sealed could have created enough of a vacuum to pull the tank fluid to the top of the siphon tube. This could have occurred in the following manner. The steam line to the jet is automatically sealed by a quick disconnect when the steam supply hose is removed or by closing the underground steam valve. The sump suction could have sealed and the sump rapidly filled up following jetting by drainage through the weep holes in the retaining parapet on the sand pad under the tank as the level in the vault had been high enough, prior to jetting, to saturate this sand base. In order to fill the siphon from the tank side to the summit a vacuum of 7.85 psi is calculated. This same vacuum would raise the accumulated water on the sump side 18.1 feet or 4 feet short of the siphon summit. The volume of water required would be about 0.37 cubic feet, equivalent to 4.5 inches level change in the one foot square by one foot deep sump. A maximum of about 0.7 cubic feet of water is required to fill the $1\frac{1}{2}$ inch steam line or an additional 8.5 inch sump level change for a total of 13 inches. Conditions for either method of initiation of siphoning could have existed.

Once the siphon was established it operated according to the energy balance stated by Bernoulli. The energy source was the difference in fluid head between tank interior and the vault. It can be shown from the data that equilibrium was not reached. Approximately 31,700 gallons were measured as leaving the tank which represents a level change in the tank of about 2 feet. The vault strapping is estimated at 730 gallons per inch. Not counting ground water in-leakage the vault level would have risen about $3\frac{1}{2}$ feet above the vault floor. This is approximately $2\frac{1}{2}$ feet of fluid short of equilibrium. An attempt was made to calculate the amount of the leak independently, using the head conditions at the start of the incident, that could be expected through one sump jet line on tank WM-187. It was calculated at 38,200 gallons over a period of twenty one and one half hours compared to the actual volume of 31,700 gallons during the same time period.

Since siphoning is directly related to the liquid height within the tan it is reasonable to assume that there is a minimum level above which siphoning is more probable. The jetting data seems to indicate that this level approximates o third of the tank height. This would explain, at least in part, why WM-187 did n siphon with 87,200 gallons (Novembe 1961) and did siphon with 106,000 gallons. is also interesting to note that ~~WM-185 and~~ WM-187 were apparently the first tank containing more than 100,000 gallon to have the sumps jetted; all previous sump jettings were made on tanks with less than this amount. It is recognized that th are other factors to consider; however, this does help explain why two siphons we experienced within a week after over nine years of operation. It also indicates that a great deal of care should be exercised when jetting the sumps of full tank

9. Effect on the Environment

No radioactive contamination of the land surface resulted from this incident. Vapor emitting approximately 100 mr/hr was released from a vault vent about 5 feet above the ground. This abated within a short time and no residual radioactivity was reported.

It is conceded that untreated or unlined concrete cannot be considered absolutely impermeable and leakage from the vault is considered possible. Corros tests using nitric acid and concrete samples indicate that damage to a two foot th concrete wall is not likely. The calculation of material balance or tank invento apparently cannot be made with adequate precision to establish conclusively that loss occurred from the vaults (Exhibit 8).

If any liquid should have escaped from the vault, movement through the regolith to any extent is improbable. The absorptive capacity of the alluvial sa and gravel composing the regolith is considered to be at least ½ gallon per cubic foot. Movement by leaching is considered possible. This would require relatively large volumes of water which does not ordinarily occur. Furthermore, movement of the isotopes would be limited by the exchange capacity of the alluvium (.071 to .670 millequivalents/g solid).

Observations in the vicinity of the MTR-ETR disposal pond under environm circumstances similar to the tank farm area show that water has moved horizontally a maximum of 600 feet through the regolith. Water has been discharged to this po at a rate of over five hundred thousand gallons per day for the past ten years. T maximum horizontal distance including a depth of 150 feet of basalt as well as the regolith does not exceed 3,500 feet.

As a monitoring precaution, three holes within 50 feet of the vaults hav been drilled to a depth of 50 feet. Samples from these holes revealed no anomalou moisture. Radioactivity to the extent of 2½ times normal background was detected one hole below 15 feet. This is somewhat anomalous but not significant. Monitorin of these holes will be continued in the future.

On the basis of the above reasoning and evidence the Committee is of the opinion that effects on the environment as a result of this incident are of minor consequence.

C. PROBABILITY AND VALIDITY OF CLAIMS AGAINST THE GOVERNMENT

The Committee does not consider that 1) any claims against the government are probable and 2) if submitted does not consider they would have validity.

D. CONCLUSIONS

1. An inadvertent transfer of approximately 31,700 gallons of first cycle aluminum nitrate-nitric acid raffinate waste stored in the CPP underground tank WM-187 to the monolithic concrete secondary retention ~~vault~~ vault occurred between 1530 hours on March 16 and 1300 hours on March 17, 1962. A similar incident involving the transfer of 33,500 gallons from Waste Tank WM-185 to its vault occurred between 2015 hours on March 19 and 0730 hours on March 20. These transfers were caused by the vault sump jet discharge line acting as a siphon following jetting of the vault sumps to drain the tank to the vault.

2. The six most recently constructed storage tanks are equipped with jet siphon discharge lines which go down to within eight inches of the bottom of the tank. The jet discharge piping, which constitutes a siphon, is not equipped with a vacuum breaker in the case of WM-185 through WM-188, although tanks WM-182 through WM-184 may be, as it was requested after a field check review of the facilities by Phillips Petroleum Company. We do not know if these were installed. This original piping is poorly designed in that the dip leg must be vented through the steam supply line each time as soon as jetting is completed. As designed these jets are sensitive to maloperation.

3. The operating group did not incorporate procedural checks to compensate for the design abnormality.

4. The estimated cost of the incident is $10,000.

5. No appreciable effect on the environment could be found.

6. It does not appear that any claims will be brought against the government or that they will be valid if presented.

7. Radioactive waste storage tanks constructed in the future should take cognizance of the design recommendations set forth in this report.

E. RECOMMENDATIONS

The Committee recognizes that absolute protection against incidents is neither possible nor practical. Design of installations prior to construction and acceptance is reviewed by the plant operator. Criticality and/or safeguards reviews of equipment at the CPP have been standard practice since its first startup in March 1953. Administrative controls have been established for the tank farm. Operator training and orientation have been a continuing concern. Improvement is always possible in retrospect and these are enumerated as part of the recommendations of this report.

The fact that the incident did occur, however, indicates strengthening of certain areas of safeguards is needed.

1. Operational Recommendations

a. The Committee endorses the following steps already initiated by the CPP Operations Branch.

(1) Complete the conversion of standard operating procedures and letters of instruction to Standard Operating Practices as soon as possible and include in written form the current oral instructions on Lock Out Control of Waste Tankage, Jetting of Sumps, Reconciliation of Waste Balances, etc.

(2) Relocate the setpoints for the existing waste tank vault sump alarms to a more reasonable level considering knowledge gained by this incident.

(3) Insure that the preventive maintenance program for waste tank instrumentation includes periodic check out of the alarm system as well as all the other instruments.

(4) Review and revise existing instructions concerning 1) the recording of pertinent operating items in the Shift Supervisor's log book, and 2) adopt a more positive means for insuring that pertinent information in the log book is transmitted to the succeeding shift personnel.

(5) Install equipment to facilitate sampling of vault sump liquid on existing tankage if possible.

(6) Correct the consolidated schematic operating flow sheet to show the correct disposition of fluid from the tank sumps.

b. Review existing over-all waste tank instrumentation for adequacy and correction of deficiencies which can be improved.

c. Provide a vent or purge connection on the steam lines above ground to existing sump jets.

d. Investigate possibility of providing means for disposal of uncontaminated water found in the tank vaults to external disposal.

e. Require that the inactivation or bypassing of any installed plant alarm be documented.

f. Keep as-built drawings of facilities up-to-date.

2. <u>Design Recommendations for Future Waste Tank Installations</u>

a. Construct the tank vaults in accordance with the basic design used for WM-187 and WM-188, incorporating the following changes:

(1) Waterproof the exterior surface of the monolithic concrete box with asphalt, in accordance with good construction practice.

(2) Revise the roof design to provide a smooth sloped slab at the upper surface and apply a built up roofing type of waterproofing.

b. Provide hot sumps for collecting radioactive waste similar to those now incorporated in WM-187 and WM-188 except that design must confine such leakage within a curb close to the circumference of the tank and not allow it to spread over the entire floor of the vault. An eave or overhang should be provided around the roof of the tank so that leakage through the vault roof or condensation inside the vault which falls upon the tank roof cannot drain into the hot sump.

c. Provide the hot sump with a jet back to the tank, incorporating the existing dip leg feature together with a vacuum breaking device. Two suggestions for accomplishing this follow:

(1) Provide a $\frac{1}{4}$ inch hole in the downcomer leg of the jet discharge line inside the tank above the high level line. A hole of this size could not pass enough air or vapor to cause a serious contamination incident.

(2) Discharge the jet into a weir box at the top of the tank with downcomer from the weir box to the bottom of the tank.

d. Provide high level alarm and liquid level recorder as in the existing sumps. Provide the sumps with means for sampling the liquid therein from ground level without removing hatches.

e. Provide a cold sump to collect water from exterior sources which drains from the floor area outside the curb around the tank. Such sump should be of about 1000 gallons capacity, say 4' x 4' x 9' deep.

f. Provide the cold sump with a jet and discharge piping manifold which will permit jetting contents into the waste storage tank or to a connection above ground for disposal. Provide this sump with means for determining specific gravity of contents, for sampling contents from above ground and with high water alarm and level recorder. When necessary to pump out the cold sump the contents would first be sampled and analyzed. If uncontaminated, a hose could be connected to the nozzle above ground and the contents jetted to a disposal ditch or into a tank for further handling.

g. Design of the jets, level indicators and level alarms for both sumps should be such that they are accessible for remote maintenance and adjustment, i.e., from ground level.

F. <u>ACKNOWLEDGMENT</u>

The Committee wishes to express its appreciation to the personnel of the Idaho Operations Office and Phillips Petroleum Company contacted during the Committee's investigation for their cooperation and assistance.

G. SIGNATURE OF THE COMMITTEE

This report represents the combined efforts of the members of the investigati committee and the findings, conclusions and recommendations are concurred in by members as witnessed by their signatures.

J. W. Latchum, Chairman
Staff Assistant to Assistant Manager, Operations
Phillips Petroleum Company
Atomic Energy Division

A. L. Biladeau
Project Engineer
Engineering and Construction Division
Idaho Operations Office
U. S. Atomic Energy Commission

E. S. Brown
Senior Engineer, Plant Engineering
Phillips Petroleum Company
Atomic Energy Division

D. D. Deming
Chemical Engineer
Chemical Processing and Development Division
Idaho Operations Office
U. S. Atomic Energy Commission

B. L. Schmalz
Chief, Waste Management Section
Site Survey Branch
Health and Safety Division
Idaho Operations Office
U. S. Atomic Energy Commission

F. M. Warzel
CPP Technical Staff Engineer, Technical
Phillips Petroleum Company
Atomic Energy Division

L. J. Weber, Assistant Manager,
Engineering
Phillips Petroleum Company
Atomic Energy Division

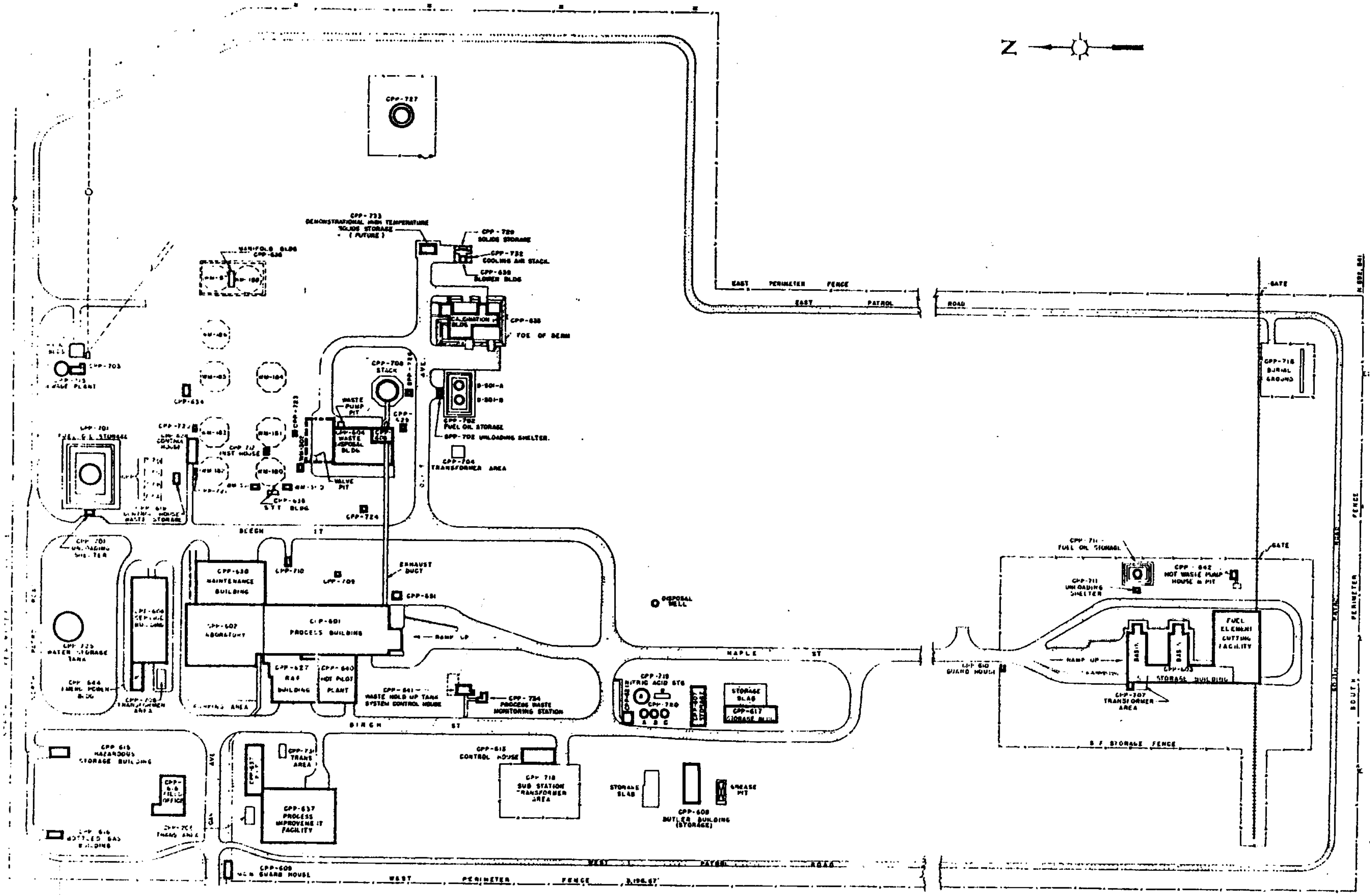
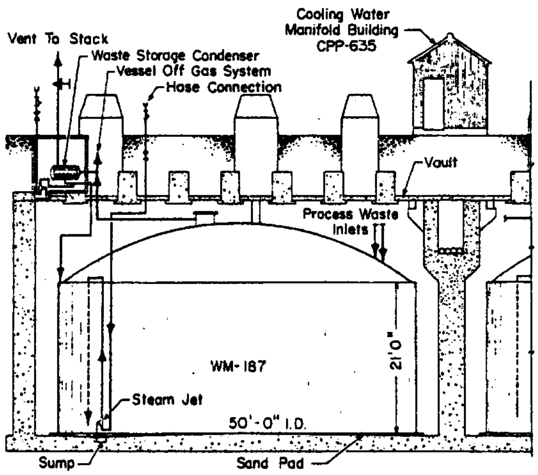
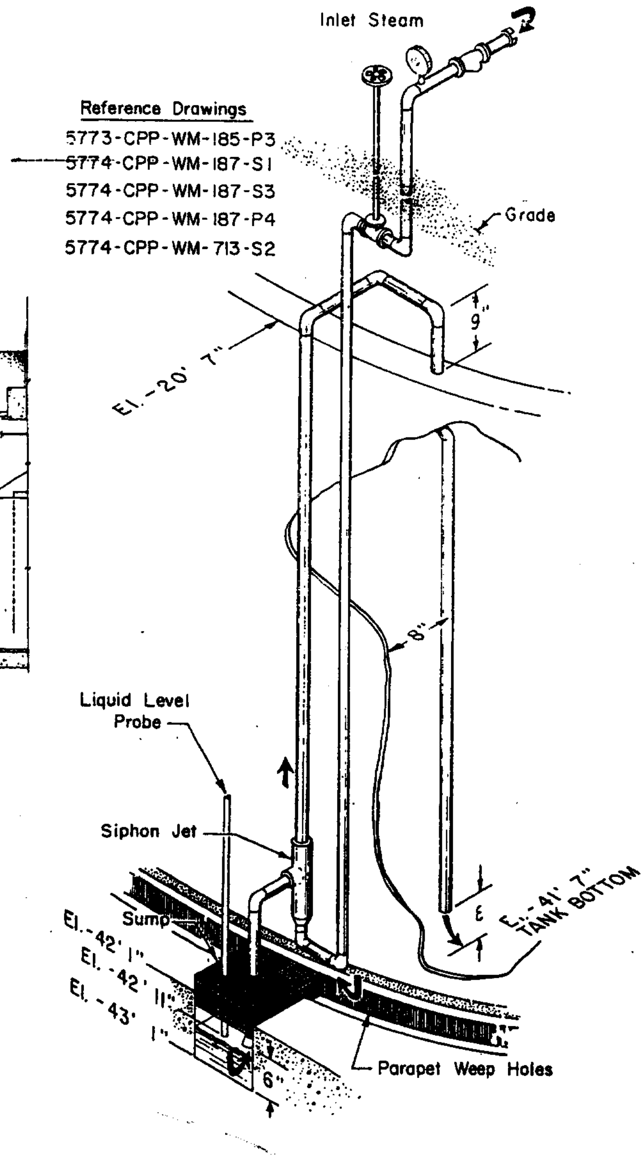


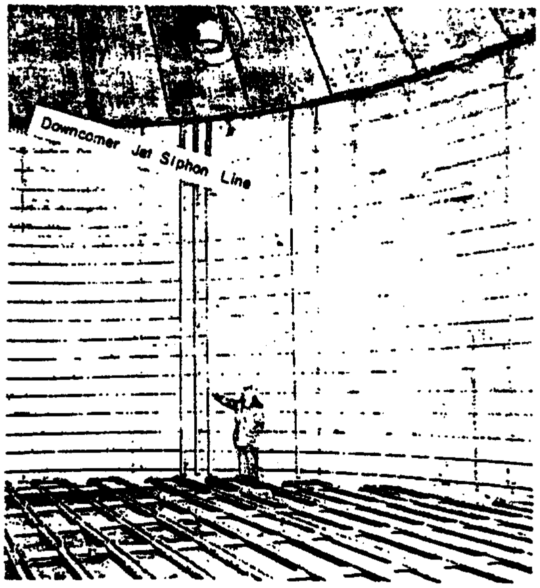
EXHIBIT 1
CPP PLOT PLAN



FLOW DIAGRAM WM-187



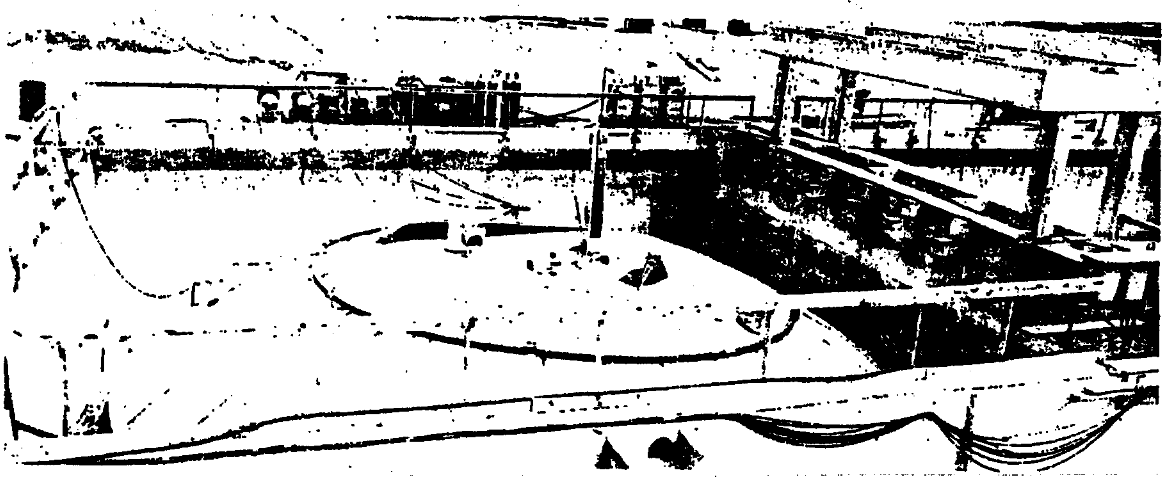
SUMP JET ISOMETRIC



INTERIOR WM-185

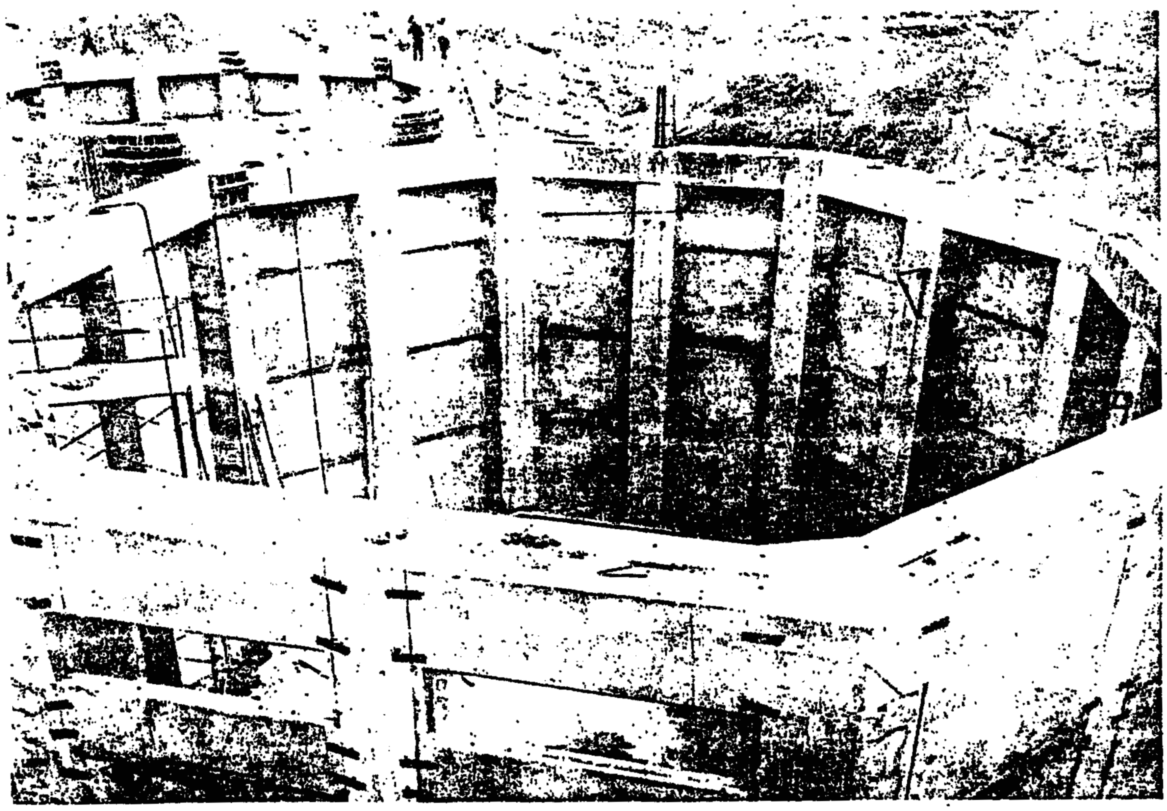
INTERIOR VAULT WM-185

VAULT AND ROOF DETAILS WM-185

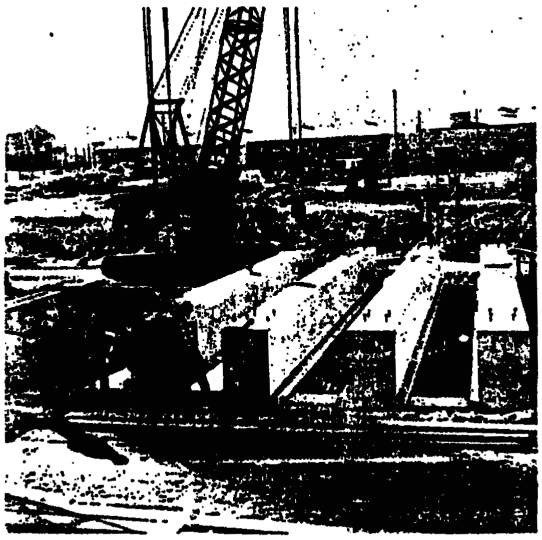


VAULT DETAILS WM-187

EXHIBIT 3



PRECAST VAULT DETAIL WM-185



ROOF DETAIL WM-188

EXHIBIT 3
(continued)

SUMMARY ESSENTIAL CONSTRUCTION INFORMATION
300,000 GALLON STAINLESS STEEL WASTE TANKS

CHEMICAL PROCESSING PLANT

	Tank	Architect-Engineer	Prime Construction Contractor	Tank Subcontractor	Year Constructed
1.	WM-180 WM-181	Foster-Wheeler	Bechtel Corporation	Chicago Bridge & Iron Company	1951-1952
2.	WM-182 WM-183 WM-184	Blaw-Knox	J. F. Pritchard Company	Chicago Bridge & Iron Company	1954-1955
3.	WM-185 WM-186	Fluor Corp.	Fluor Corp.	Chicago Bridge & Iron Company	1957-1958
4.	WM-187 WM-188	Fluor Corp.	Fluor Corp.	Hammond Iron Works	1958-1959

EXHIBIT 4

Phillips Petroleum Company
Idaho Falls, Idaho

March 23, 1962

inter-office correspondence/subject: <u>Syphoning from WM-185</u>
Ay-40-62A

Mr. M. H. Bartz
CF-607

Dear Sam:

During the evening shift on March 19, 1962, the liquid in waste tank WM-185 began to syphon into the waste tank sump just after the tank sump had been jetted into the tank. After the transfer of material from the tank to the jet was confirmed by obtaining a sample of the material in the sump, the material in the sump was jetted back into the tank. Transfer of material from WM-185 to WM-188 was started, but this was stopped before a significant quantity of material was transferred. As you know, the transfer was stopped when perusal of the tank construction drawings showed the sump discharged into the bottom of the tank and not in the top as was shown on the flowsheets.

The sumps were emptied and the following material balance was obtained:

	Gallons
Volume of solution in WM-185 prior to syphon	185,372
Volume of solution in WM-185 when return of material from sump was started	152,569
Volume of solution transferred by syphon to sump (by difference)	32,803
Volume of solution in WM-185 after transfer of material in sump completed	194,185
Increase over original volume	8,813

Jet dilution $\frac{8,813}{32,803}$ or 26.9 per cent

With this high jet dilution, it appears unlikely that any appreciable quantity of high level waste leaked into the ground. An analogous transfer from WM-188 to WM-187 using a jet with the same specifications as those in the sump gave only a 4.7 per cent jet dilution.

Enclosed is a copy of C. E. Burks's, the duty CPP supervisor, report of action taken prior to and just after the syphon started. The actions taken appear to be appropriate considering what was then known about the jet transfer lines.

There is still no adequate explanation as to why the sump jets have been used in the past without starting a syphon and why in the case of WM-187 and WM-185 in quick succession the syphoning was started.

A proposal is being prepared for the Operating Committee to provide more reliable instrumentation and alarms for the liquid levels in the waste farm tanks and sumps. All jet sump transfer lines will be equipped with a positive air bleed to break syphons as they start to develop. The flowsheets will be modified to show that sump transfer lines discharge to the bottom of the tanks where appropriate. We have, as yet, been unable to find detailed drawings on the original waste tanks WM-180 and 181 so will continue a search so that the nature of the sump jet discharge line in these tanks can be established. All other 300,000 gallon waste tank jet transfer lines discharge to the bottom of the tank. Recommendations for future waste tank construction have been given to Construction Liaison.

Very truly yours,

ALAyers:jc

Attachment

cc: (w/attachment)
R. L. Doan
J. P. Lyon
M. H. Bartz
J. W. Latchum
M. E. Weech
C. B. Amberson
M. Young
File

Phillips Petroleum Company
Idaho Falls, Idaho

March 23, 1962

inter-office correspondence/subject: Syphoning from WM-185
Burk-2-62A

Mr. A. L. Ayers
Office

Dear Arnold:

On evening shift, March 19, 1962, a syphon of the WM-185 contents to the vessel vault occurred following the jetting of the vault sumps to WM-185. No personnel were exposed. It is not known if any aqueous waste was lost from the vault to the ground.

At 1840 on March 19, 1962, the two WM-185 vault sumps were jetted to WM-185 to reduce the level in the north sump and to clear the alarm on the south sump. Before jetting, the north sump, LI-5-WM, showed 9 inches; and the south sump, LI-3-WM, showed 14.2 inches indicating only a small amount of liquid. During recent months we have experienced trouble with ground water entering some of the vaults, and it is assumed that the contents of the WM-185 vault sumps was a small amount of water. A high pressure steam hose was installed from CPP 634 to the south sump jet connection near WM-185 by L. Jensen, mechanic. The south sump was jetted by me approximately five times. In each case the LI-3-WM would drop to approximately five to six inches depth, and the steam was allowed to remain on for approximately two to four minutes to blow the jet discharge free of liquid. After the steam was shut off, the sump level would slowly increase to approximately 12 to 14 inches over a two to three minute period. This indicated that either the steam blowing did not clear the residual aqueous from the discharge line, or a tricle stream from the vault floor was causing a slow sump level increase. During each jetting operation the WM-185 vacuum would slightly decrease and would attempt to return to the normal vacuum after the jetting was stopped. This indicated the sump jet had removed most of the liquid, and the jet was steaming. From these assumptions the jetting of the south sump was discontinued, and the steam hose attached to the north sump jet connection. The south sump was jetted twice. In both cases the LI-5-WM decreased to four inches and then increased to approximately six inches in two to four minutes after the steam was turned off. The six-inch level in LI-5-WM is below the alarm point, and I considered this level to be the lowest level attainable. The steam hose was again installed on the south sump jet connection, and the sump was jetted approximately three more times. The LI-3-WM reacted the same as proviously stated; therefore, the sump jettings were discontinued. In view of the conclusions previously made that the volume of liquid in the sumps was apparently negligible, the jet discharge line apparently ended at the top of WM-185 (as numerous WM-185 prints showed and other jet discharges

The difference in the sump level readings found the evening of the syphoning was later determined to be caused by a leak in the north sump probe line.

To prevent a recurrence of this situation, the following recommendations are made:

1. The WM-180 series waste vessel piping prints should be revised to show the vault sump jet discharge lines discharging at the bottom of each vessel.

2. All the tank farm and CPP 604 sump level indicators should be labeled with the following information: a. Sump dimensions and volume; b. Sump overflow depth with water; c. Sump jets must be vented after each jetting operation.

3. The present sump level indicators should be discarded, and a 0-to-20-inch manometer installed. Manometers are reliable in indicating levels and do not develop mechanical difficulties as Bourdon or diaphragm gauges can.

4. Should any aqueous waste vessels be constructed at CPP in the future, the vault sump jet discharge lines should be piped to discharge to the top of the vessel and not to the bottom.

Very truly yours,

C. E. Burks

CEBurks:jc

cc: File

at CPP are piped), and the jet steam line block valve is below grade thus eleminating any apparent need to vent the jet, it was concluded that venting the jet was not necessary. Also, the WM-185 vault sump jets do not have a jet vent header, and to vent the jet would require opening the jet steam line to the atmosphere which would in turn vent WM-185 to the atmosphere.

H. A. Rayburn was assigned to taking the bi-hourly readings on the WM-187 system due to a release of waste into the WM-187 vault on March 16, 1962. During his reading tour Mr. Rayburn found the WM-185 level decreasing at 2240. The decrease had started at 2200. Mr. Rayburn immediately called me, and I immediately secured Mr. J. Mefford, instrument repairman. I inspected the WM-185 liquid level and the vault sump liquid levels. The sump levels had not appreciably changed since the 1840 jettings. The south sump indicator showed 14 inches, and the north sump showed 12.75 inches. Therefore, it was first felt the WM-185 level instrument was out of order. I had Mr. Mefford check the level recorder calibration, zero, and for leaks between the transmitter and the cell wall valve. All were satisfactory. Next, I had the spare hi-pressure level probe placed in service; and it agreed with the regular probe. I then had a manometer installed on the sump level indicators to determine the accuracy of the indicated levels. The manometer showed 65.8 inches in the south sump and 26.1 inches in the north sump. The WM-185 level drop was then considered to be authentic even though the vault sump levels did not agree. I then informed you of the situation by telephone, completed writing the "Preliminary Statement on Incident," AED 265, and left the plant. Mr. L. Morrow continued checking the situation on the night shift of March 20, 1962.

Upon return to home on the evening of March 21, 1962, I called Mr. M. P. Hales asking of the status of WM-185. Neither WM-185 or WM-187 had developed a leak through the vessel walls, but instead the loss of material from the vessels to the vaults was caused by a syphoning of the vessel contents via a vault sump jet line. Instead of the jet discharge lines ending at the top of the vessels, the lines looped to the top side walls into the vessels and discharged into the vessel bottoms.

With this piping arrangement on the jet discharge the probability of a syphon starting would depend upon the volume of liquid in the sump following the operating of a sump jet. Calculations showed 1.57 gallons of water was required to fill the jet discharge line before a syphon would start from WM-185; and assuming the same steam condensing rate per unit pipe area for the 1 1/2 inch steam supply line, the steam supply line would draw in approximately 5.95 gallons of water. The total water required in the south sump would then be 1.57 plus 5.95 or 7.52 gallons to cause syphon to start without venting the jet. The 12 x 12 x 12 inch sump holds 7.48 gallons when full.

RECEIVED

MAR 3 1 1962

F. M. WARZEL

PHILLIPS 66

Idaho Falls, Idaho
March 30, 1962

INTER-OFFICE CORRESPONDENCE / SUBJECT: Acid Resistance of Concrete
Flet-8-62A-N

NOTEGRAM

To: F. M. Warzel

From: R. D. Fletcher:nw *RDF*

A brief experiment was conducted to determine the approximate rate of attack on the concrete secondary containers of tanks WM-185 and 187 by the waste solution which overflowed the tanks.

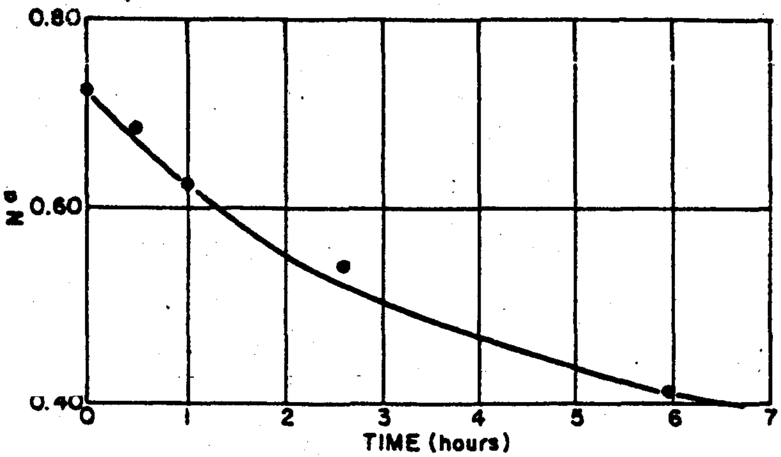
The concrete sample used in the experiment was a 7.6 cm x 7.6 cm x 8.1 cm rebar support block previously fabricated by construction of random composition concrete. The block was air dried overnight at room temperature prior to immersion in the 1.6M aluminum nitrate-0.7M nitric acid simulated waste solution. Acid analysis samples were taken of the original solution and at 1/2 hour, 1 hour, 2-1/2 hours, and 6 hours following the sample immersion. Results of these samples are shown on the attached graph. The observed reaction of the solution and the concrete was fairly vigorous initially but showed a marked reduction after the first hour. After four to five hours exposure only a few small bubbles were being produced. The following equation gives the penetration rate:

$$\text{Penetration rate, cm/hr} = \frac{\text{wt loss, gms}}{(\text{density, gms/cm}^3)(\text{Area, cm}^2)(\text{time, hrs.})}$$

$$= \frac{34.73 \text{ gms}}{(2.05 \text{ gms/cm}^3)(363 \text{ cm}^2)(6 \text{ hrs})}$$

$$= .008 \text{ cm/hr}$$

cc: J. A. McBride
M. E. Weech
K. L. Rohde
R. D. Fletcher



MATERIAL BALANCE AND COMPOSITION - WM-185 AND WM-187

Several material balance calculations have been made of the volume of waste in tanks WM-185, 6, 7, and 8 and in the vaults around tanks WM-185 and 7 before, during, and after the incidents.

WM-185 Material Balance

Results of calculations made comparing the gain in the contents of the WM-185 vault to the loss in the contents of WM-185 are shown in Figure A, together with total quantities lost from the tank. Some readings are available of tank level and vault level while the siphoning was occurring and were used in preparing the figure. The two lower curves in Figure A show the loss in tank volume and the gain in the vault after 0130 hours on March 19. 0130 hours was selected as a starting point since at that time, the level in the vault was above the irregularities in the vault floor, sand pad, curb around the sand pad, etc., and a volume of uniform cross-section was being filled. The upper line in Figure A represents the total volume lost from the tank, as determined from instrument readings, after the siphon began at 2015 hours on March 19. The total quantity lost from the tank was 33,500 gallons up to 0730 on March 20, at which time jetting of vault contents back to the tank was started. Jetting was completed at 1730 hours on March 20; thus, there was waste solution in WM-185 vault for a total of 21-1/4 hours, 11-1/4 of which material was siphoning into the vault and 10 hours of which material was being transferred back to the tank. The plot volume lost from WM-185 compared to volume gained in the vault (lower two curves of Figure A) cover six hours (28%) of this period. That there was no great loss of waste to the ground during this period is obvious. Indeed it seems likely that there was no loss of waste from the vault to the ground during this period, although this cannot be said with certainty. It is almost impossible to estimate reliably the probable errors in the calculations, but is may be noted that one-tenth of a chart dimension (0.0 mm) on the WM-185 liquid level recorder corresponds to about 300 gallons.

Whether any waste was lost from WM-185 vault during the time the vault contents were being jetted back to the tank is less certain. Once jetting operations were instituted, dilution and volume change resulted from condensation of the motive steam. Apparent dilution during the transfer from the vault to the tank was calculated by four different methods: 1) increase in the reading of the liquid level instrument on WM-185 only; 2) decrease in the reading of the density instrument on WM-185 only; 3) increase in the volume of waste solution (using both the increase in the liquid level reading and the decrease in the specific gravity reading); and 4) temperature increase in the contents of WM-185. Jet dilution, as calculated by the four methods were: 1) 5.5%; 2) 79%; 3) 19.4%; and 4) 14% of the 33,500 gallons transferred. It is believed that the first is the most reliable, since the liquid level instrument measures the hydrostatic head of liquid above a probe (which is about 3/4 inch above the tank bottom). The hydrostatic head will thus be essentially independent of temperature and solution non-homogeneity. As long as the material added to the tank is water the increase in liquid level reading (when multiplied by 3.15, the reciprocal of the instrument ratio, to give inches of water pressure) is a direct measure of the inches of water added to the tank. In the case of WM-185 even this calculation is not straightforward however, since material was jetted (with two jets) from WM-185 to WM-[illegible] for about 30 minutes while the WM-185 vault contents were being jetted back to WM-185. It is difficult to determine from instrument readings how much material was transferred. The jets are reported to have a capacity of 40 gpm each, and thus an allowance of 2400 gallons was made in all the above calculations.

Specific gravity and temperature calculations are subject to errors arising from non-homogenieties in the tank contents, as are volume calculations, since specific gravity is used in the volume calculations.

The 5.5% dilution represents 1675 gallons and is thus quite dependent on the accuracy of the estimated 2400 gallons transferred to WM-188. It is suggested that 6% be used, which is in line with commonly accepted values. Thus the loss in available tankage in WM-185 because of jet dilution in transferring the vault contents back to WM-185 is 6% of 33,500 gallons, or 2,000 gallons. At $2.50 per gallon, this amounts to $5,000.

WM-187 Material Balance

From five simultaneous readings of tank and sump instruments, comparisons were made of the loss in tank contents and the gain in vault contents. The total quantity lost from the tank was also calculated. The results are presented in Figure B, as before. Again, it is evident that no large volume of waste was lost from the vault to the ground, although it is impossible to assess the accuracy of the calculations. As in the case of WM-185, no attempt was made to compare the decrease in vault contents to the increase in tank contents as the material was being jetted back to the tank.

Examination of the instrument charts indicates that the siphon began at about 1530 hours on March 16. Jetting back to the tank was started at 1300 hours on March 17, and completed at 0230 hours on March 18. Thus, waste was in the vault for a period of 35 hours, 21-1/2 hours of which material was siphoning into the vault, and 13-1/2 hours of which the vault contents were being jetted back into the tank. 31,700 gallons had been lost from the tank to the vault at the time jetting began.

Complete volume balance calculations around WM-187 are less precise than those around WM-185. In summary, 31,700 gallons siphoned to the vault, which were transferred back to WM-187. While this transfer was underway, transfer of a portion of the contents of WM-187 to WM-186 was started. These two transfers were terminated by 1000 hours on March 18; it was not until March 21 that the tank was again disturbed, at which time the contents of WM-188 were jetted to WM-187. Summation of these transfers through March 18 shows a decrease in total volume of 600 gallons, whereas with a 6% jet dilution, there should have been an increase of 6,000 gallons. This discrepancy could be due to a loss from the vault to the ground, although this is not believed to be the case based on the information shown in Figure B, and also since the vault is a poured concrete structure. The discrepancy could also be due to errors in the instrument readings on WM-187 either before or after the incident or of WM-186 after the incident.

Although 67,000 gallons of waste were transferred from WM-187 to WM-186 (71,000 gallons that were collected in WM-186 less an assumed 6% jet dilution) and 59,500 gallons were transferred from WM-188 to WM-187, the dilution cost for these transfers should not be charged to this incident as these transfers would have been required in any event. If 6% dilution is assumed, the chargeable lost volume is 6% of the 31,700 gallons that siphoned to the vault, or 1900 gallons. At $2.50 per gallon, this amounts to $4,750.

Waste Composition

Samples were taken from both WM-185 and WM-187 tanks on February 14, 1962. No substantial quantity of waste was added to either tank between then and the time the siphonings occurred. A sample was also obtained from each vault during the siphonings. Laboratory analysis of the samples showed the following results:

	WM-185		WM-187	
	Tank	Vault	Tank	Vault
SP Gr (@ 25°C)	1.289 ± .004	1.292	1.285 ± .004	1.256
Acid (Normality)	0.60 ± .10	0.61	0.95 ± .10	0.76
β Activity(1) (2)	--	1.4×10^{11}	--	1.1×10^{10}
γ Activity(3)	5.4×10^{9}	--	4.2×10^{9}	--
Cs-137(2)	3.8×10^{9}	--	1.7×10^{9}	--
Sr-90(2)	3.3×10^{9}	--	2.1×10^{9}	--
Ce-141(2)	6.4×10^{7}	--	2.0×10^{8}	--
Ce-144(2)	3.3×10^{9}	--	4.7×10^{9}	--
Np(2)	1.2×10^{3}	--	--	--
Ru-103-106(2)	$\sim 7 \times 10^{7}$	--	$\sim 7 \times 10^{8}$	--
Zr-Nb(2)	$\sim 4 \times 10^{8}$	--	nil	--
Pu(2)	7.3×10^{5}	--	2.9×10^{5}	--

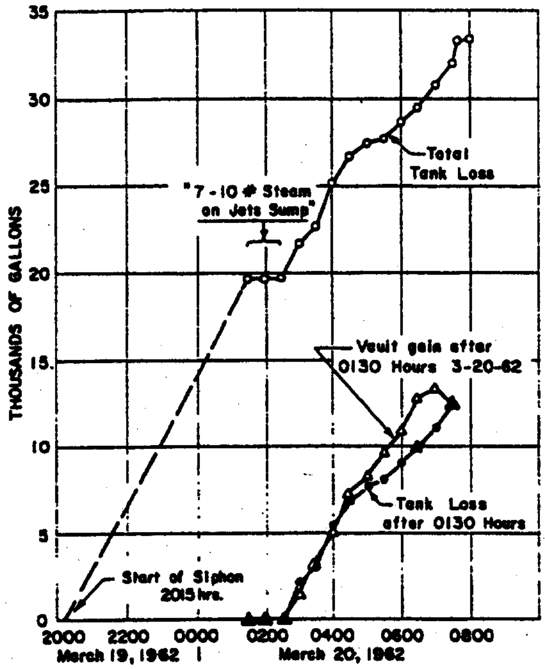
(1) Based on instrument calibration with a thulium source.

(2) d/m/ml

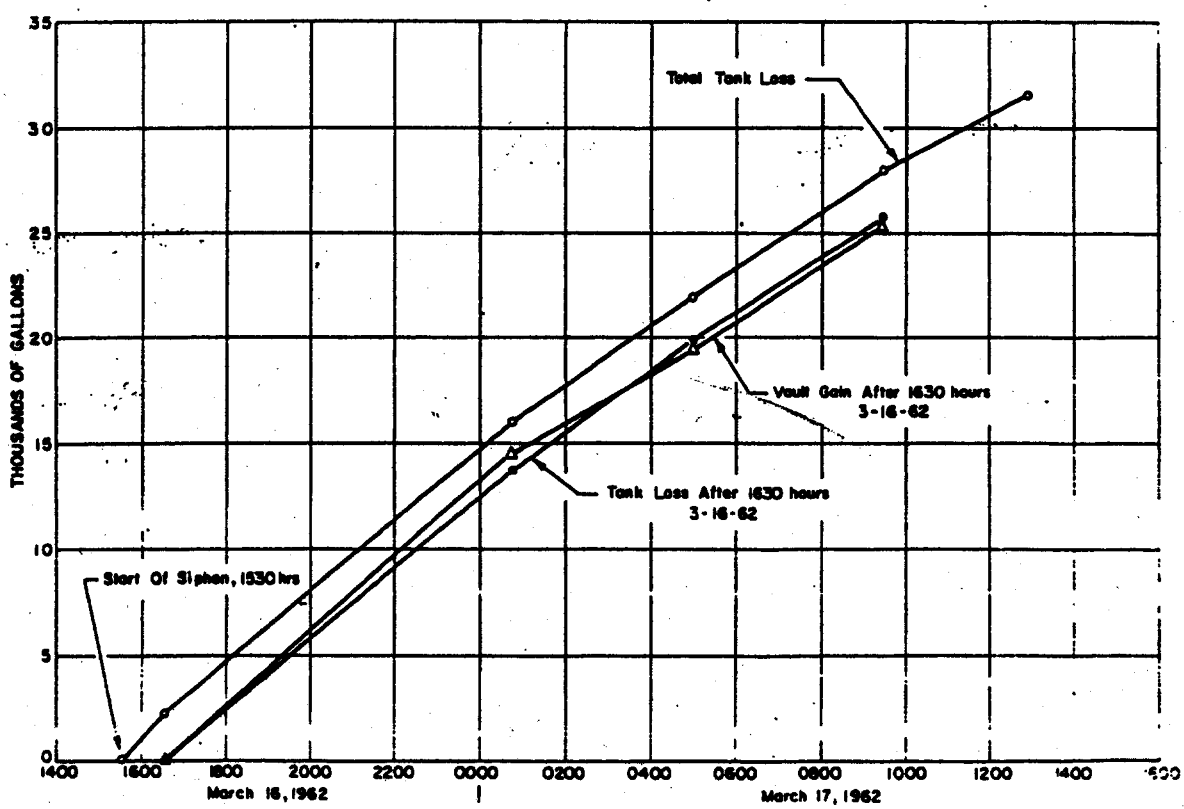
(3) γ/m/ml

The specific gravity and acidity of the WM-185 tank and vault samples agree remarkably well. The WM-187 samples, however, show a significant difference; no explanation for the discrepancy exists. The WM-187 vault sample was taken sometime after transfer of the vault contents back to the tank had been initiated and hence any small amount of water left in the vault at the time siphoning occurred could not account for a change of this magnitude in the 31,700 gallons, albeit mixing may have been incomplete. The specific gravity on the vault sample (1.256) is in close agreement with that determined from the tank instrument (1.253) just before siphoning began. Additionally, the relative changes in the acid concentration and specific gravity could not be accounted for by dilution with water. The tank contents were essentially homogeneous when sampled on February 14, as shown by gross gamma counts made on two samples taken from each tank at different levels.

In summary, the analyses shown in the tabulation for WM-185 are believed to represent rather accurately the concentration of some of the more significant isotopes in any waste that may have escaped from the WM-185 vault. The WM-187 results are subject to some question as to their validity but nevertheless represent the best available information.



WM-185 Loss in Tank Contents
(& Comparative Tank Loss -
Vault Gain)
During Siphon Period



WM-187 Loss in Tank Contents
(& Comparative Tank Loss-Vault Gain)
During Siphon Period

EXHIBIT 8
(continued)

3010-104

UNITED STATES GOVERNMENT

Memorandum

RECEIVED
LATCHUM
MAR 22 1962
4/22/62
Est.

TO : Those Listed Below

DATE: MAR 21 1962

FROM : H. N. Eskildson, Manager
Idaho Operations Office

H N Eskildson

SUBJECT: INVESTIGATION OF CPP WASTE TANK LEAKAGE INCIDENT OF MARCH 17, 1962

SYMBOL: CP:KKK

A committee is hereby established to investigate the causes and effects of leakage of CPP Waste Tank WM-187. Membership of this committee shall be:

J. W. Latchum, Chairman
A. L. Biladeau
E. S. Brown
D. D. Deming
B. L. Schmalz
F. M. Warzel
L. J. Weber

The committee will make a full investigation of the incident and will submit a written report to me, in accordance with AEC Manual Chapters 0502 and 0703, on or before April 18, 1962.

The investigation shall include all phases of the incident and its consequences. The following specific areas shall be reported:

1. The nature and extent of the incident, including costs.

2. The cause and responsibility for the incident.

3. Effects on the environment, if any, and probable duration of effects.

(continued)

Addressees:

J. W. Latchum, Phillips
A. L. Biladeau, IDO
E. S. Brown, Phillips
D. D. Deming, IDO
B. L. Schmalz, IDO
F. M. Warzel, Phillips
L. J. Weber, Phillips

4. Recommended corrective action to minimize or preclude recurrence, as appropriate.

5. Probability and validity of any claims against the government.

The committee shall have access to all pertinent records and shall consult with, and obtain assistance from, IDO and contractor personnel, as necessary.

CC: R. L. Doan
J. P. Lyon
J. R. Horan